

**APPENDIX B**

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**ACS FAILURE DETECTION AND CORRECTION**

## TRMM Flight Operations Plan

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SIGNATURE

Test Num	Category	Test	Control Mode
A1.1.1	IRU	Compares the rate computed from the digital increment angle output with the last sampled analog rate output.	All
A1.1.2	IRU	Validate raw analog gyro data via A/D not ready flag.	All
A1.1.3	IRU	Digital gyro cross-channel comparison for each axis.	All
A1.1.4	IRUI	Gyro motor current each axis in limits	All
A1.2.1	MTB	Validate raw MTB data via A/D "not ready" flag.	1-7
A1.2.2	MTB	MTB current in limits	2-7
A1.3.1	TAM	Validate raw TAM data via A/D "not ready" flag.	1-7
A1.3.2	TAM	Magnitude of the component mag. field 3-vector in limits.	1-7
A1.3.3	TAM	Static TAM outputs test.	1-7
A1.3.4	TAM	Measured mag field magnitude compares w/computed s/c ephemeris position.	5
A1.4.1	DSS	Required number of good samples obtained to do Yaw update.	5
A1.4.2	DSS	Validate raw DSS data via A/D "not ready" flag.	1-7
A1.5.1	CSS	Validate raw CSS data via A/D "not ready" flag.	1-7
A1.5.2.1	CSS	Output does not meet criteria for specified period of time.	2,5
A1.5.2.2			
A1.5.3	CSS	Output does not change for specified period of time.	1-5,7
A1.6.1	RWA	Compare previous wheel torque cmd to differentiated wheel tach signal computed torque.	2-7
A1.6.2	RWA	Validate raw RWA data via A/D "not ready" flag.	1-7
A1.7.1	ESA	ESA powered on	1-7
A1.7.2	ESA	Static values in quadrant sensor reading (A,B,S)	3-6
A1.7.3	ESA	Compare A,B, and S data	3-6
		ACE selection/configuration incorrect checks:	
A2.1.1	ACE FDC	ACE A in control and ACE B=no data	All
A2.1.2	ACE FDC	ACE A not in control and ACE B= no data	All

## Control Mode Key

1= Standby	4= Yaw Acq.	7= CERES Cal
2= Sun Acq	5= Nominal Mission	8= Delta-V
3= Earth Acq	6= Yaw maneuver	9= Delta-H

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<b>Test Num</b>	<b>Category</b>	<b>Test</b>	<b>Control Mode</b>
A2.1.3	ACE FDC	ACE A in control and ACE B in control	All
A2.1.4	ACE FDC	ACE A not in control and ACE B not in control	All
A2.1.5	ACE FDC	ACE A not in control and ACE B in control	All
A2.1.6	ACE FDC	ACE A = no data and ACE B not in control	All
A2.1.7	ACE FDC	ACE A = no data and ACE B in control	All
		The following checks applicable when ACE B is in control and no data from ACE A is available:	
A2.1.8	ACE FDC	ACE B= no data	All
A2.1.9	ACE FDC	ACE B not in control	All
A3.1.1	ACS Control	System momentum not decreasing and above limits	2
A3.1.2	ACS Control	Sun not acquired by specified time	2
A3.2.1	ACS Control	R, P error angles not within accuracy by specified time.	3
A3.3.1	ACS Control	Y error angle not with accuracy by specified time.	4
A3.4.1.1	ACS Control	R,P,Y position errors	5
A3.4.1.2	ACS Control	R,P,Y gyro rate errors	5
A3.4.1.3	ACS Control	Spacecraft momentum exceeds limits	5
A3.4.2.1	ACS Control	R, P position errors	6
A3.4.2.2	ACS Control	R, P gyro rate errors	6
A3.4.2.3	ACS Control	Spacecraft momentum exceeds limits	6
A3.5.1	ACS Control	R, P, Y attitude errors in Delta V	8
A3.5.2	ACS Control	R, P, Y body momentum less than limits	8

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A3.5.3	ACS Control	System momentum and commanded momentum not decreased in Delta H	9
A3.6.1	ACS Control	R, P, Y position errors.	7
A3.6.2	ACS Control	Gyro rates in inertial hold below limits	7
A4.1.1	System H	System momentum check	5
A4.2.1	ACS Control	Loss of on-board computer control of spacecraft	
A5.1.1	SA Index	Array not at index when expected	1
A5.2.1	SA Position	Array not positioned where commanded: SA angle exceeds software stops	2-7
A5.2.2	SA Position	Array not positioned where commanded: GSACE encoder position not equal the last commanded position.	2-7
A5.2.3	SA Position	Array not positioned where commanded: GSACE not in closed loop and SA's enabled for ACS control	1-7
A5.3.1	Comm	Loss of 1773 communication w/ GSACE	1-9
A5.4.1	SA Drives	SA POT Position error	1-7
A6.1.1	CPU Failure	ACS data not provided	1-9
A7.1.1	H/W HSKPNG	H/W housekeeping packet not received	1-9
A7.1.2	H/W HSKPNG	gyro motor reference voltage within limits	1-9
A7.1.3	H/W HSKPNG	RWA motor current within limits	1-9
A7.1.4	H/W HSKPNG	RWA motor regulated voltage within limit	1-9

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<b>Test Num</b>	<b>Category</b>	<b>Test</b>	<b>Control Mode</b>
A7.1.5	H/W HSKPNG	ACE +5V and $\pm 15V$ regulated voltages within limits	1-9
A7.1.6	H/W HSKPNG	ESA regulated voltage within limits	1-9
A7.1.7	H/W HSKPNG	ESA temperature within limits	1-9
A7.1.8	H/W HSKPNG		1-9
A7.1.9	H/W HSKPNG		1-9
A7.2.1	System Fail	ACS sensor/actuator configuration different than to be used in safehold	2-9
A7.2.2	System Fail	A/D anomaly and ACE in control reconfigured	2-9

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